



Changes in seasonal and diurnal cycles of ozone and temperature in the eastern US

Author(s): Bloomer BJ, Vinnikov KY, Dickerson RR
Year: 2010
Journal: Atmospheric Environment. 44 (21-22): 2543-2551

Abstract:

The pollutant tropospheric ozone causes human health problems, and environmental degradation and acts as a potent greenhouse gas. Using long-term hourly observations at five US air quality monitoring surface stations we studied the seasonal and diel cycles of ozone concentrations and surface air temperature to examine the temporal evolution over the past two decades. Such an approach allows visualizing the impact of natural and anthropogenic processes on ozone: nocturnal inversion development, photochemistry, and stratospheric intrusion. Analysis of the result provides an option for determining the duration for a regulatory ozone season. The application of the method provides independent confirmation of observed changes and trends in the ozone and temperature data records as reported elsewhere. The results provide further evidence supporting the assertion that ozone reductions can be attributed to emission reductions as opposed to weather variation. Despite a (similar to 0.5 degrees C decade⁻¹) daytime warming trend, ozone decreased by up to 6 ppb decade⁻¹ during times of maximum temperature in the most polluted locations. Ozone also decreased across the emission reduction threshold of 2002 by 6-10 ppb indicating that emission reductions have been effective where and when it is most needed. Longer time series, and coupling with other data sources, may allow for the direct investigation of climate change influence on regional ozone air pollution formation and destruction over annual and daily time scales. Published by Elsevier Ltd.

Source: <http://dx.doi.org/10.1016/j.atmosenv.2010.04.031>

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Temperature

Air Pollution: Interaction with Temperature, Ozone

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Climate Change and Human Health Literature Portal

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified